made of an IrMn type material.

REMARKS

This is responsive to the Office Action dated June 24, 2002, in which the Examiner rejects all the pending claims 1-10 as being indefinite under 35 U.S.C. §112 and/or as being anticipated by Gill (U.S. Patent No. 6,129,209) under 35 U.S.C. §102(e). The specification and abstract are also objected for formality and language deficiencies.

Applicants have amended the specification and abstract as above, and believe that the deficiencies have all been overcome. No new matter has been introduced in the amendments.

Applicants have also amended independent claim 1 to overcome the rejections, and respectfully traverse the rejections based on the amended claim 1 and the following explanation. In particular, the applicants have further limited independent claim 1 with a distinguishing feature that "said exchange biasing layer is made of a IrMn type material". As fully supported in the disclosure of the original specification (e.g., page 3, lines 7 -11), using IrMn increases the blocking temperature as compared to other materials such as FeMn, NiMn, PtMn and NiO, and eliminates annealing treatment.

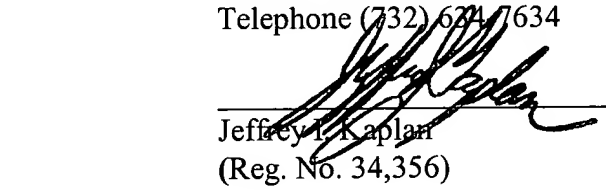
This distinguishing feature can not be found anywhere in the cited Gill patent. In Gill, the antiferromagnetic (AFM) layer, which corresponds to the exchange biasing layer in the present application, is formed of NiO (see col. 7, lines 13-14). Therefore, claim 1 is not anticipated by Gill and is thus patentable under 35 U.S.C. §102. At least for the same reason, its dependent claims 2-10 are also patentable for having included all the limitations in claim 1.

Applicants therefore respectfully request for reconsideration in view of the above remarks and amendments. The Examiner is authorized to deduct additional fees believed due from our Deposit Account No. 11-0223.

Respectfully submitted,

KAPLAN & GILMAN, L.L.P.
900 Route 9 North
Woodbridge, New Jersey 07095
Telephone (732) 634-7634

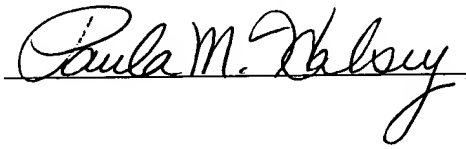
Dated: September 12, 20002



Jeffrey I. Kaplan
(Reg. No. 34,356)

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal service as first class mail, in a postage prepaid envelope, addressed to Box Non-Fee Amendment, Commissioner for Patents, Washington, D.C. 20231 on September 12, 2002.

Dated September 12, 2002 Signed  Print Name Paula M. Halsey

MARKED-UP VERSION OF THE
AMENDED SPECIFICATION, ABSTRACT AND CLAIM 1

IN THE SPECIFICATION:

Page 1, paragraph 2:

Spin-valve structures such as Giant Magneto Resistance (GMR) and Spin-tunnel Magneto Resistance (TMR) devices recently have been extensively studied and have been the subject of many disclosures. GMR- and TMR- devices comprise as a basic building block two ferromagnetic layers separated by a separation layer of a non-magnetic material. This structure will be referred to as the basic GMR- or TMR- stack of the magnetic device, or is referred to as the GMR-or TMR- structure. Such structure has a magneto resistance characteristic and shows the GMR- or TMR- effect. The separation is a non-ferromagnetic metallic layer for GMR- devices, and is a non-metallic, preferably insulating, layer for TMR- devices. Over the separation layer, there is a magnetic coupling between the two ferromagnetic layers. The insulating layer in the TMR-devices allows for a significant probability for quantum mechanical tunneling of electrons between the two ferromagnetic layers. Of the two ferromagnetic layers, one is a so-called free layer, and the other is a so-called **[or]** hard pinned layer. The free layer is a layer whose magnetization direction can be changed by applied magnetic fields with a strength lower, preferably substantially lower, than the strength of the field required for changing the magnetization direction of the pinned layer. Thus, the pinned layer has a preferred, rather fixed magnetization direction, whereas the magnetization direction of the free layer can be changed quite easily under an external applied field. A change of the magnetization of the free layer changes the resistance of the TMR- or GMR- device. This results in the so-called magneto resistance effect of these devices. The characteristics of these magnetic devices or systems can be exploited in different ways. For example a spin valve read-out element utilizing the GMR-effect can be used for advanced hard disk thin film heads. Also magnetic memory devices such as standalone or

non-volatile embedded memory devices can be made based on the GMR- or TMR- elements. An example of such memory devices are MRAM devices. A further application is a sensor device or system for magnetic characteristics. Such sensors are used for example in anti-lock braking (ABS) systems or other automotive applications.

Page 7, paragraph 2:

In order to demonstrate the improved magnetic field range of the present invention, samples similar to those shown in Fig. 1 with differing numbers of ferromagnetic layers in the AAF stack 30, both odd and even, were prepared [whereby] such that the total amount of ferromagnetic material in the AF stacks 30was kept essentially the same. Thicknessess of the materials are given in Table 1. As can be seen from this table the thickness of the ferromagnetic layers towards the outside of the stack of layers was made in some cases thinner than layers towards the center of the stack. However, the present invention includes making the thickness of outer ferromagnetic layers thinner than an inner layer.

Page 7, Table 1:

TABLE 1

No.	THICKNESS OF THE RESPECTIVE LAYERS IN [MM] NM														
	CoFe	Ru	CoFe	Ru	CoFe	Ru	CoFe	Ru	CoFe	Ru	CoFe	Ru	CoFe	Ru	CoFe
2	4	0.8	4												
3	2	0.8	4	0.8	2										
4	2	0.8	2	0.8	2	0.8	2								
5	1.4	0.8	2	0.8	1.4	0.8	2	0.8	1.4						
6	1.4	0.8	1.3	0.8	1.4	0.8	1.3	0.8	1.4	0.8	1.3				
8	1	0.8	1	0.8	1	0.8	1	0.8	1	0.8	1	0.8	1	0.8	1

*Number of non-adjacent ferromagnetic layers

IN THE ABSTRACT:

A robust GMR or TMR effect type multilayer structure [comprising] comprises a free and a pinned ferromagnetic layer, with a wide magnetic field range [is described,] as required, for example in automotive applications. [The improvement is obtained by using an] An odd number of non-adjacent ferromagnetic layers is used in an exchange-biased Artificial Anti-Ferromagnet as the pinned layer, and the exchange biasing layer is made of an IrMn type material.

IN THE CLAIMS:

1. (Amended) A magneto-resistive device comprising [a substrate which carries] a free and a pinned ferromagnetic layer separated by a non-magnetic spacer layer therebetween for providing a magnetoresistive effect, said pinned layer comprising an artificial antiferromagnet layer system (AAF), and an exchange biasing layer, the exchange biasing layer being adjacent to and magnetically influencing the AAF layer system wherein the AAF layer system has an odd number of non-adjacent ferromagnetic layers greater than or equal to three and said exchange biasing layer is made of an IrMn type material.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	**Kars-Michiel Hubert Lenssen; Antonius Emilius Theodorus Kuiper**
Title of Invention	:	**MAGNETO-RESISTIVE DEVICE WITH A MAGNETIC MULTILAYER STRUCTURE (As Amended)**
Date Filed	:	**June 19, 2001**
Serial No.	:	**09/884,219**
Examiner	:	**STRECKER, Gerard R.**
Art Unit	:	**2862**
Attorney Docket Number	:	**NL 000361**

Box Non-Fee Amendment
Commissioner for Patents
Washington, DC 20231

REPLACEMENT PAGE

SIR:

This will serve as a replacement page to include with the Amendment that was recently filed in the U.S. Patent and Trademark Office on September 12, 2002 in response to the June 24, 2002 Office Action, in connection with the above-referenced patent application.

IN THE CLAIMS:

1. (Amended) A magneto-resistive device comprising a free and a pinned ferromagnetic layer separated by a non-magnetic spacer layer therebetween for providing a magnetoresistive effect, said pinned layer comprising an artificial antiferromagnet layer system (AAF), and an exchange biasing layer, the exchange biasing layer being adjacent to and magnetically influencing the AAF

BTOC EAF Cont'd

layer system wherein the AAF layer system has an odd number of non-adjacent ferromagnetic layers greater than or equal to three, and said exchange biasing layer is made of an IrMn type material.

REMARKS

The Examiner is authorized to deduct additional fees believed due from our Deposit Account No. 11-0223.

Respectfully submitted,

KAPLAN & GILMAN, L.L.P.
900 Route 9 North
Woodbridge, New Jersey 07095
Telephone (732) 634-7634

Dated: September 27, 2002

Jeffrey L. Kaplan
(Reg. No. 34,356)

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being faxed to Examiner Strecker at fax no. (703) 746-4501, addressed to Box Non-Fee Amendment, Commissioner for Patents, Washington, D.C. 20231 on September 27, 2002.

Dated September 27, 2002 Signed Paula M. Halsey Print Name Paula M. Halsey